

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

M.Tech-II Semester (ECE)

COURSE CODE (CREDITS): 22M11CI211(3)

MAX. MARKS: 25

COURSE NAME: SOFT COMPUTING

COURSE INSTRUCTORS: MUNISH SOOD

MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks																		
Q1	Maximize the function $f(x) = x^2 - 1$ where x varies from 0 to 30, using Genetic Algorithm. Choose initial population size n=4.	3	5																		
Q2	Implement OR gate using Widrow Hoff Delta learning rule for artificial neural networks.	3	5																		
Q3	Using Hebb's rule find weights required to perform the following classification of given input pattern. '+' symbol represents the value +1 and empty symbol equals -1. Consider " I " belongs to the members of the class and hence target value = 1 and " O " does not belong to the members of the class and hence target value = -1. <table><tr><td>+</td><td></td><td>+</td></tr><tr><td></td><td>+</td><td></td></tr><tr><td>+</td><td></td><td>+</td></tr></table> " I " <table><tr><td>+</td><td>+</td><td>+</td></tr><tr><td>+</td><td></td><td>+</td></tr><tr><td>+</td><td>+</td><td>+</td></tr></table> " O "	+		+		+		+		+	+	+	+	+		+	+	+	+	4	5
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Q4	Suppose we have a simple fuzzy inference system to control the speed of a fan based on the temperature in a room. The input temperature is crisp and ranges from 0 to 100 degrees Fahrenheit. The output fan speed is also crisp and ranges from 0 to 10. The system has three fuzzy sets for the temperature input: "Cold", "Warm", and "Hot". The following rules govern the system: 1. IF temperature is Cold THEN fan speed $y = 0.03x+2$ 2. IF temperature is Warm THEN fan speed $y = 0.05x$ 3. IF temperature is Hot THEN fan speed $y = 0.04x+1$ Suppose the input temperature is 75 degrees Fahrenheit. What should the output fan speed be according to the Sugeno fuzzy inference system? Use triangular membership function.	4	5																		
Q5	Given a fuzzy relations $\tilde{R} = \begin{bmatrix} 0.3 & 0.4 \\ 0.5 & 0.2 \end{bmatrix}$ between two fuzzy sets \tilde{X} and \tilde{Y} . Similarly $\tilde{S} = \begin{bmatrix} 1 & 0.2 & 0.4 \\ 0.8 & 0.3 & 0.7 \end{bmatrix}$ between two fuzzy sets \tilde{Y} and \tilde{Z} . Obtain fuzzy relation T as a composition between fuzzy relations using Max-Product composition.	1	5																		